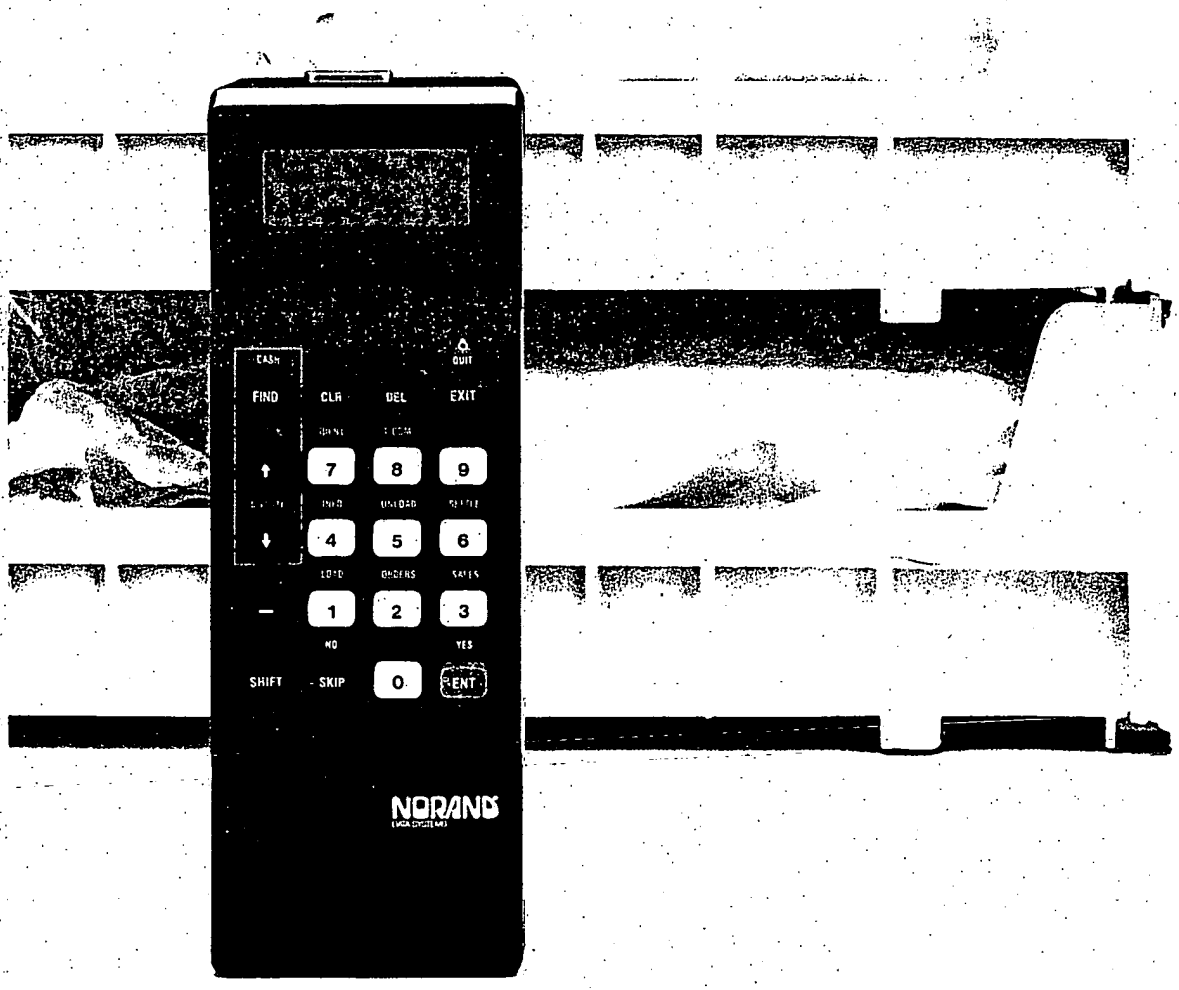
APPENDIX A

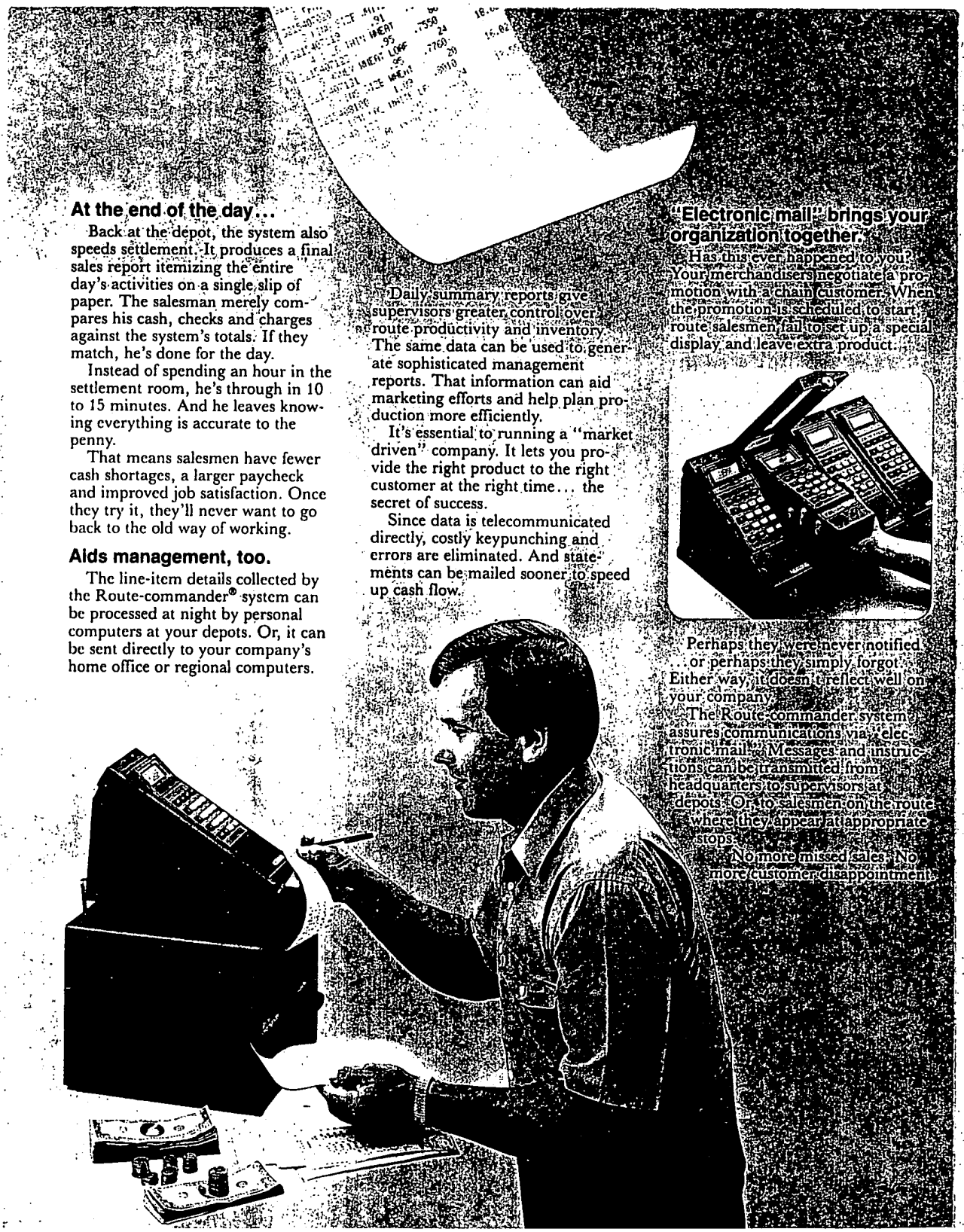
STEVEN E. KOENCK
APPLICATION FOR PATENT
"BATTERY CONDITIONING SYSTEM HAVING COMMUNICATION WITH BATTERY PARAMETER MEMORY MEANS IN CONJUNCTION WITH BATTERY CONDITIONING" ATTY. DOCKET 5717-Y

NORAND®
DATA SYSTEMS

Route-commander®
Portable Data System

for bakery distribution





At the end of the day...

Back at the depot, the system also speeds settlement. It produces a final sales report itemizing the entire day's activities on a single slip of paper. The salesman merely compares his cash, checks and charges against the system's totals. If they match, he's done for the day.

Instead of spending an hour in the settlement room, he's through in 10 to 15 minutes. And he leaves knowing everything is accurate to the penny.

That means salesmen have fewer cash shortages, a larger paycheck and improved job satisfaction. Once they try it, they'll never want to go back to the old way of working.

Aids management, too.

The line-item details collected by the Route-commander® system can be processed at night by personal computers at your depots. Or, it can be sent directly to your company's home office or regional computers.

Daily summary reports give supervisors greater control over route productivity and inventory. The same data can be used to generate sophisticated management reports. That information can aid marketing efforts and help plan production more efficiently.

It's essential to running a "market driven" company. It lets you provide the right product to the right customer at the right time... the secret of success.

Since data is telecommunicated directly, costly keypunching and errors are eliminated. And statements can be mailed sooner to speed up cash flow.

"Electronic mail" brings your organization together.

Has this ever happened to you? Your merchandisers negotiate a promotion with a chain customer. When the promotion is scheduled to start, route salesmen fail to set up a special display and leave extra product.

Perhaps they were never notified ...or perhaps they simply forgot. Either way, it doesn't reflect well on your company.

The Route-commander system assures communications via "electronic mail." Messages and instructions can be transmitted from headquarters to supervisors at depots. Or to salesmen on the route, where they appear at appropriate stops.

No more missed sales. No more customer disappointment.

APPENDIX B

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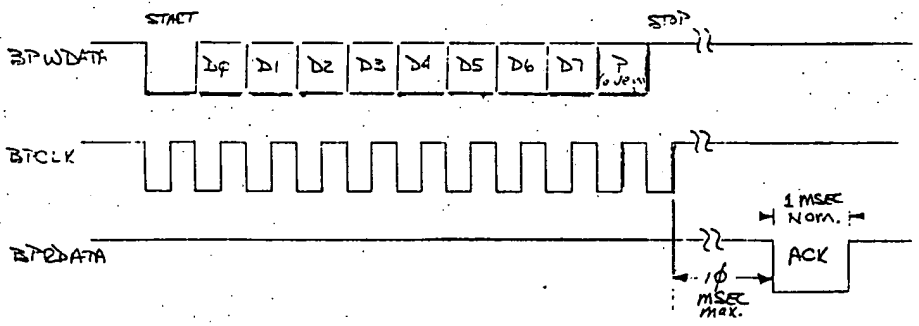
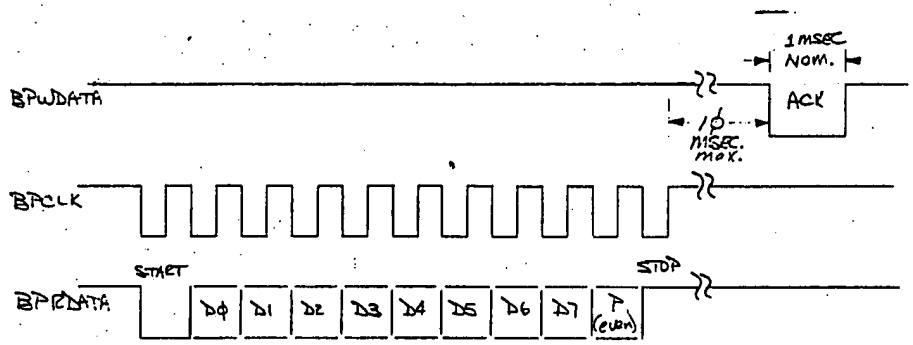
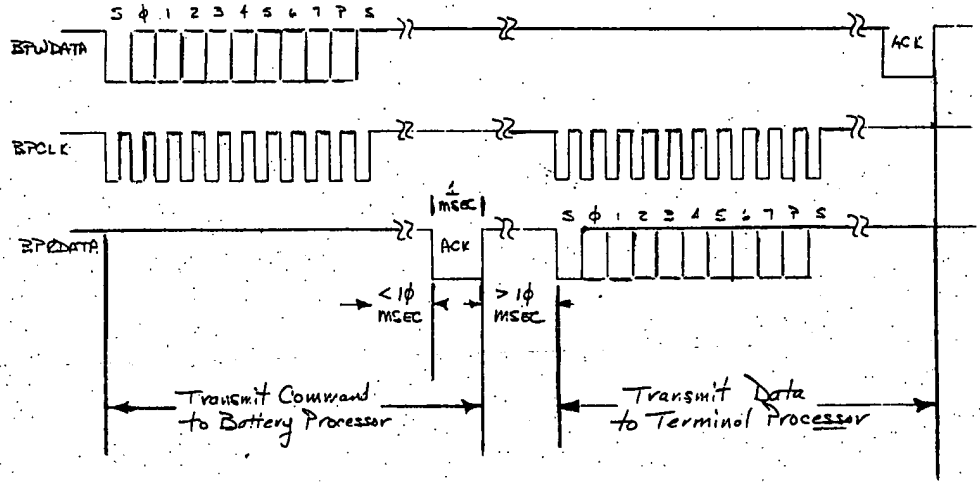


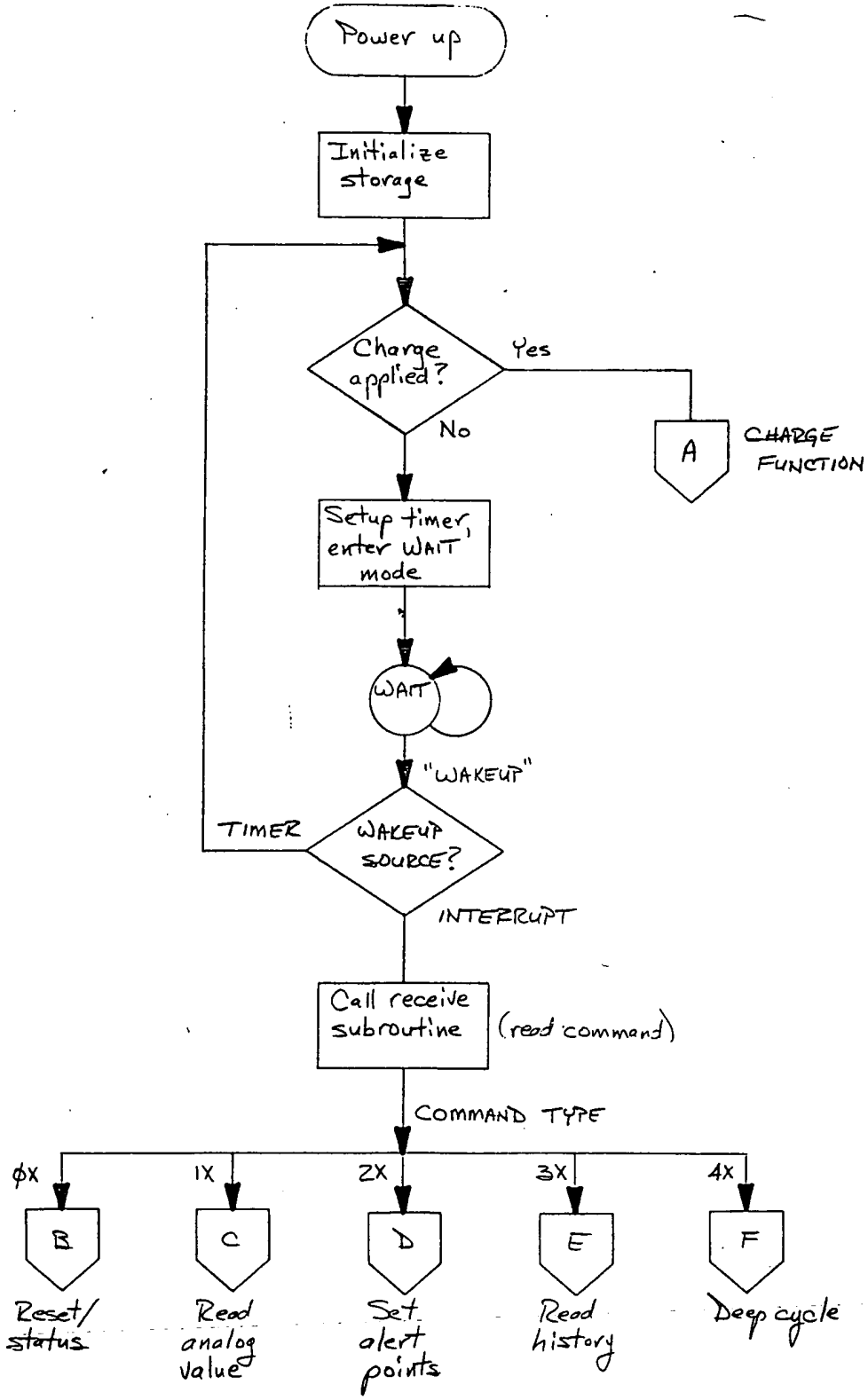
Terminal to Battery Processor Communication

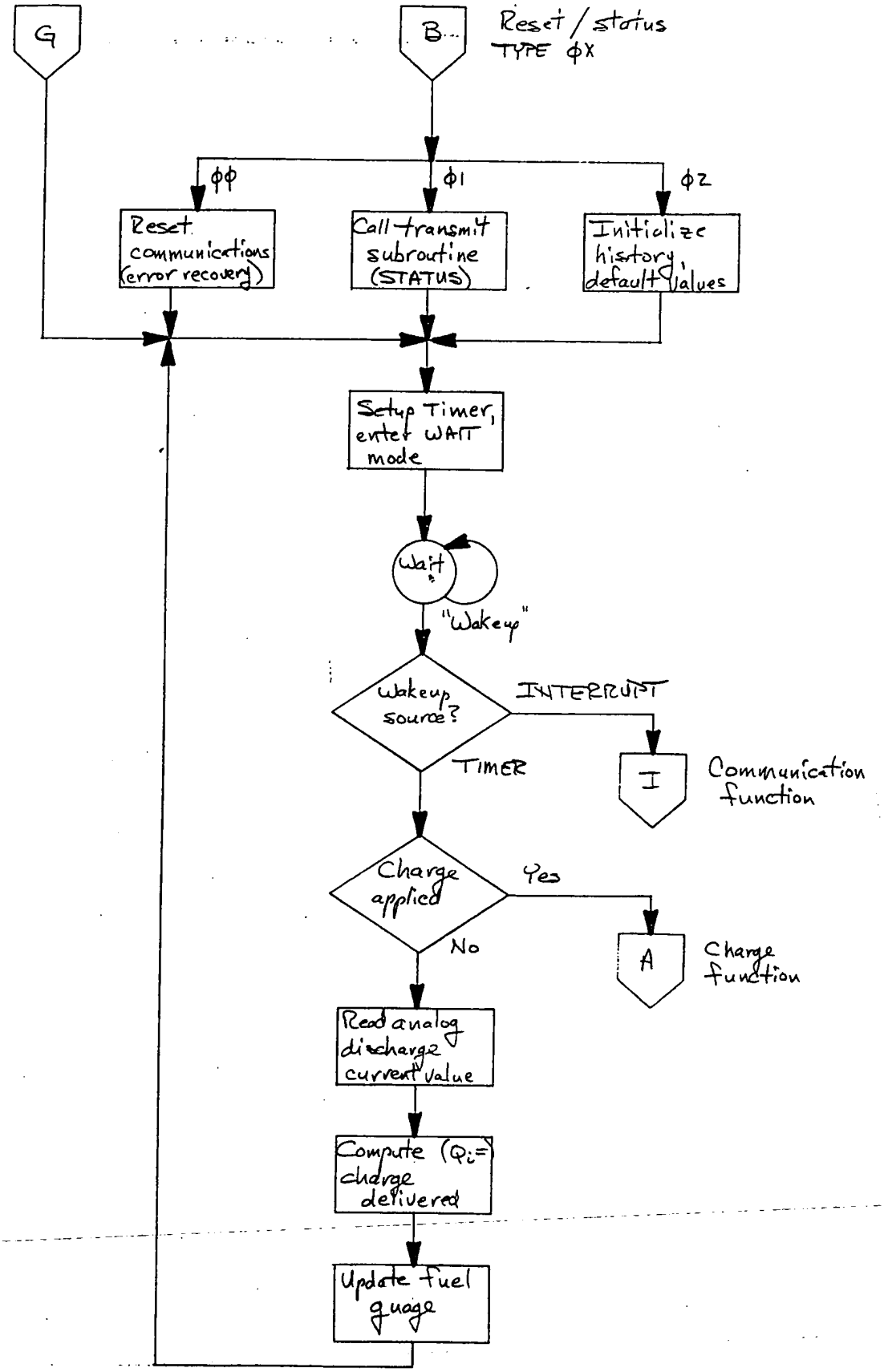


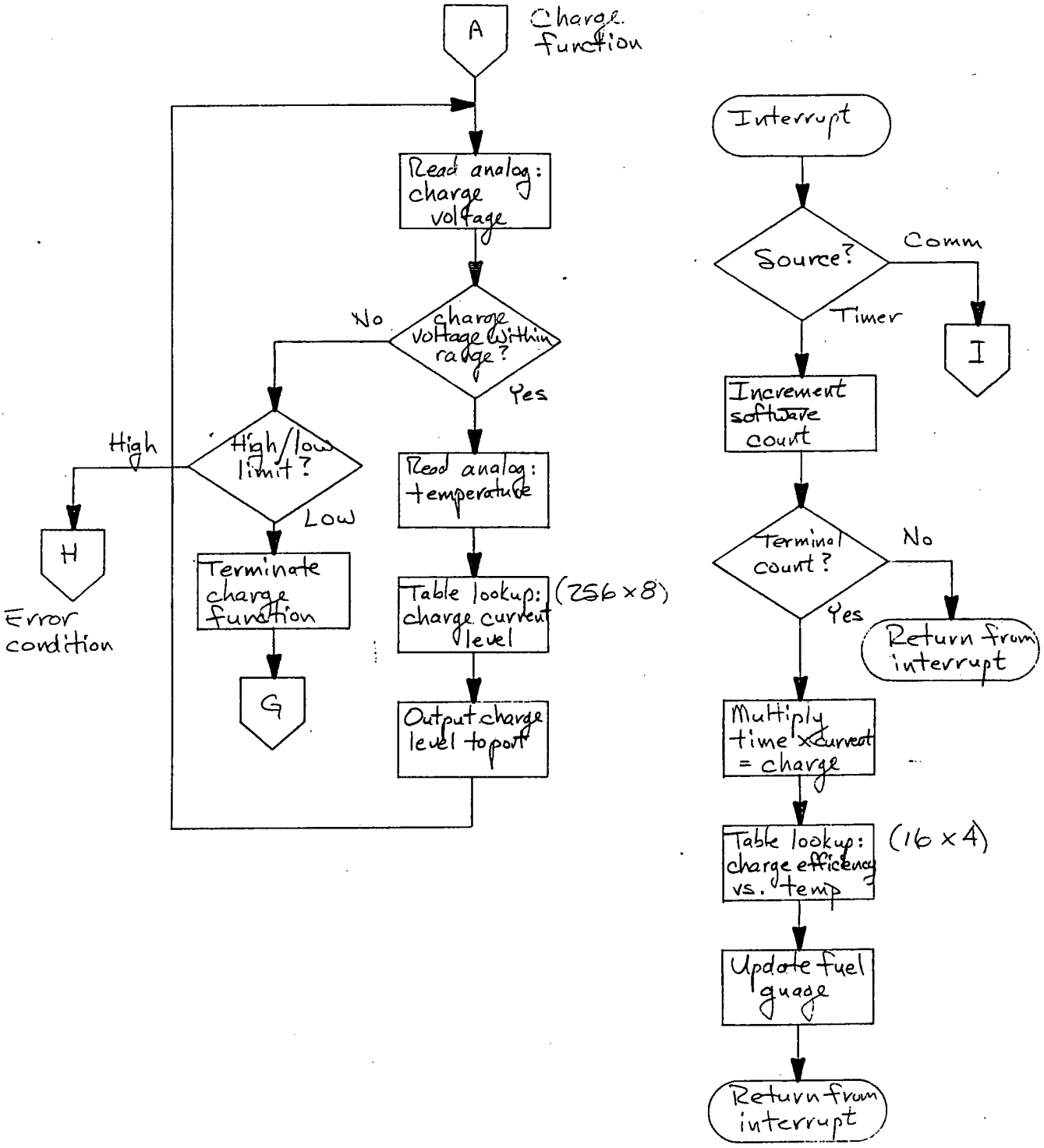
Battery Processor to Terminal Communication



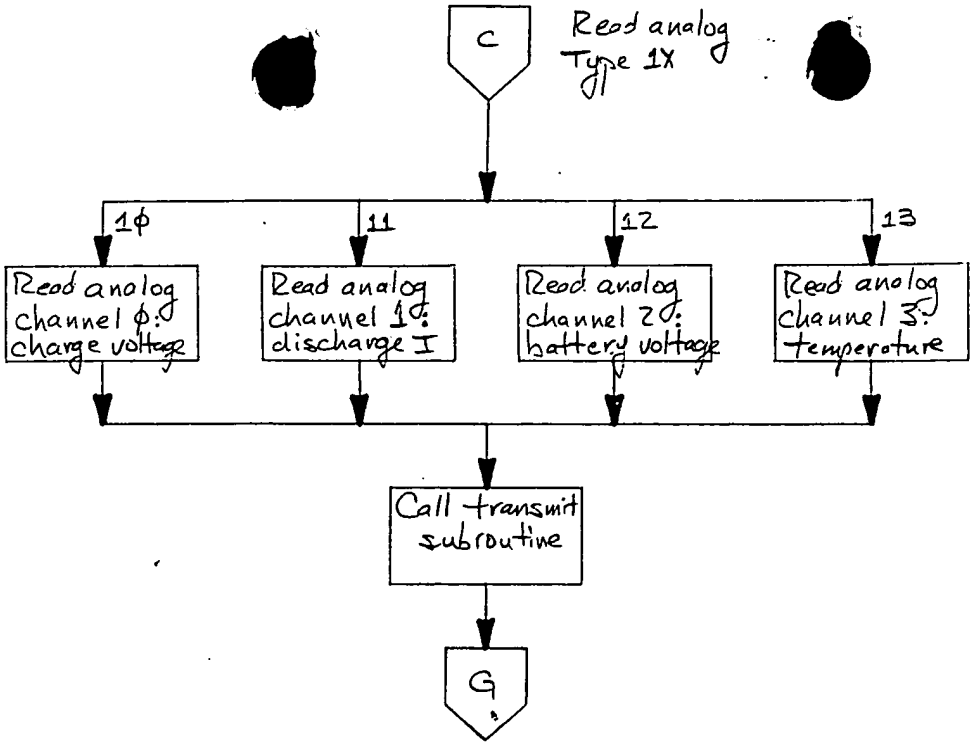
Command / Response Communication Protocol

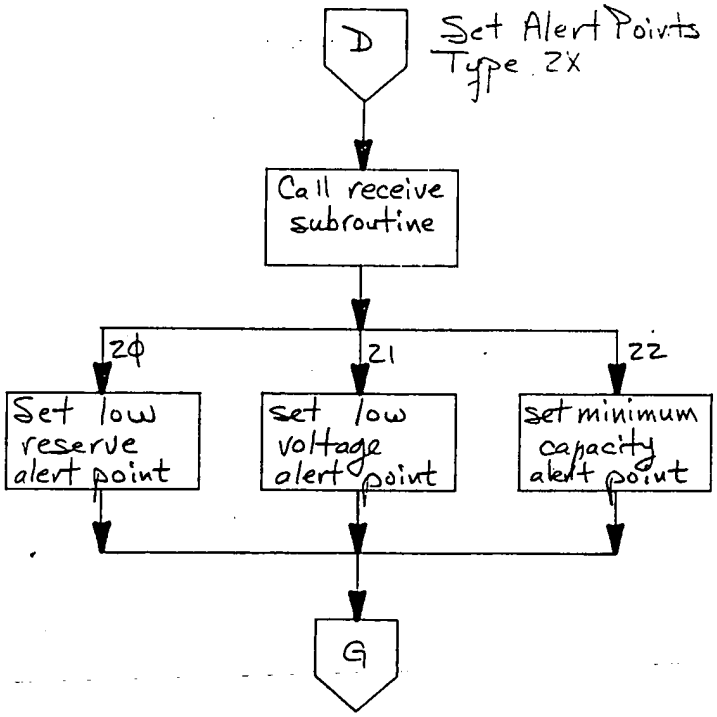

Power up
Initialize storage
Charge applied?
Yes
No
A
CHARGE FUNCTION
Setup timer, enter WAIT mode
WAIT
"WAKEUP"
TIMER
WAKEUP SOURCE?
INTERRUPT
Call receive subroutine
(read command)
COMMAND TYPE
ϕX
1X
2X
3X
4X
B
C
D
E
F
Reset/ status
Read analog value
Set alert points
Read history
Deep cycle

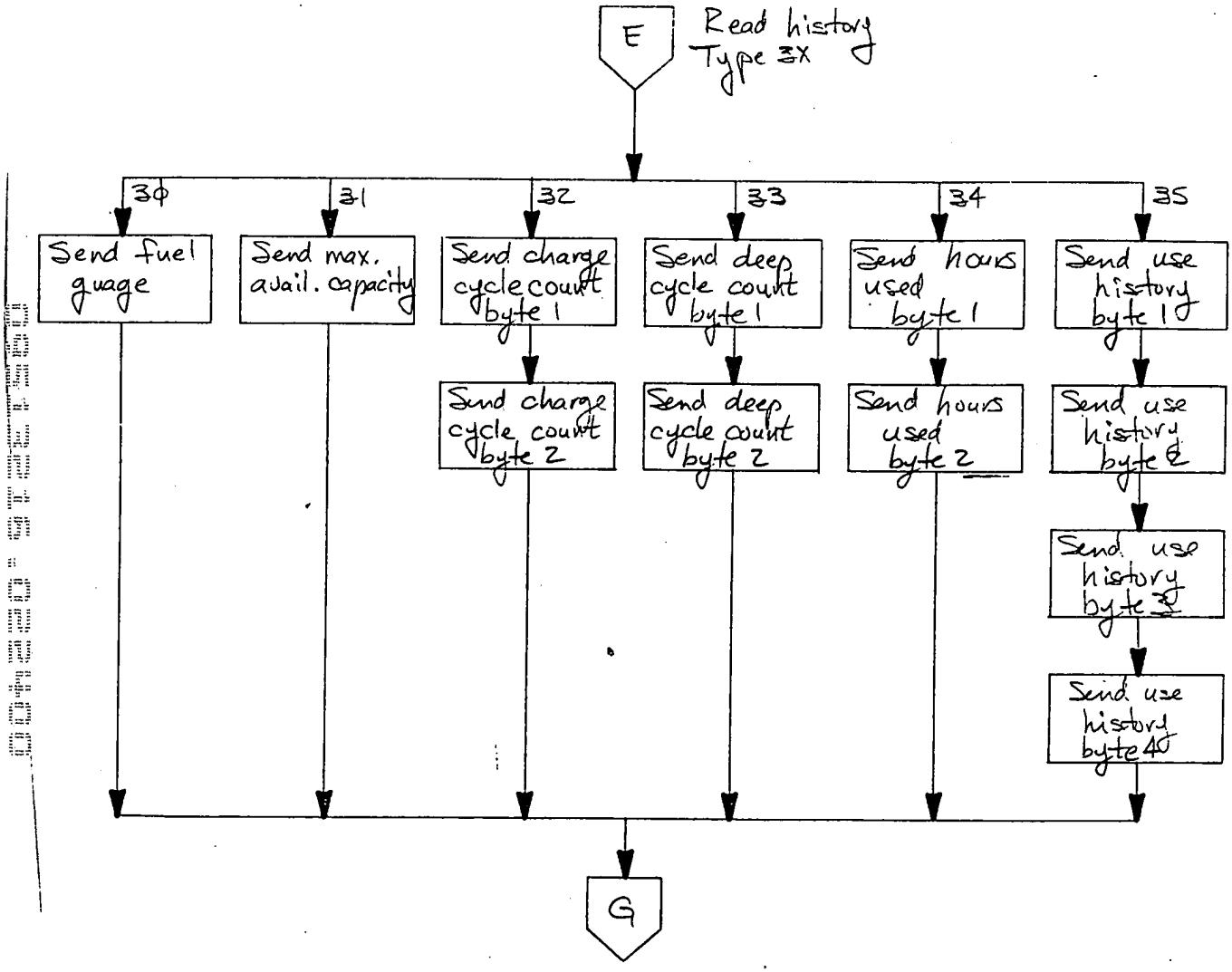

G
B
Reset / status
TYPE ϕX
ϕϕ
ϕ1
ϕ2
Reset communications (error recovery)
Call transmit subroutine (STATUS)
Initialize history, default values
Setup Timer, enter WAIT mode
Wait
"Wakeup"
Wakeup source?
INTERRUPT
TIMER
I
Communication function
Charge applied
Yes
No
A
Charge function
Read analog discharge current value
Compute (Qi= charge delivered
Update fuel guage

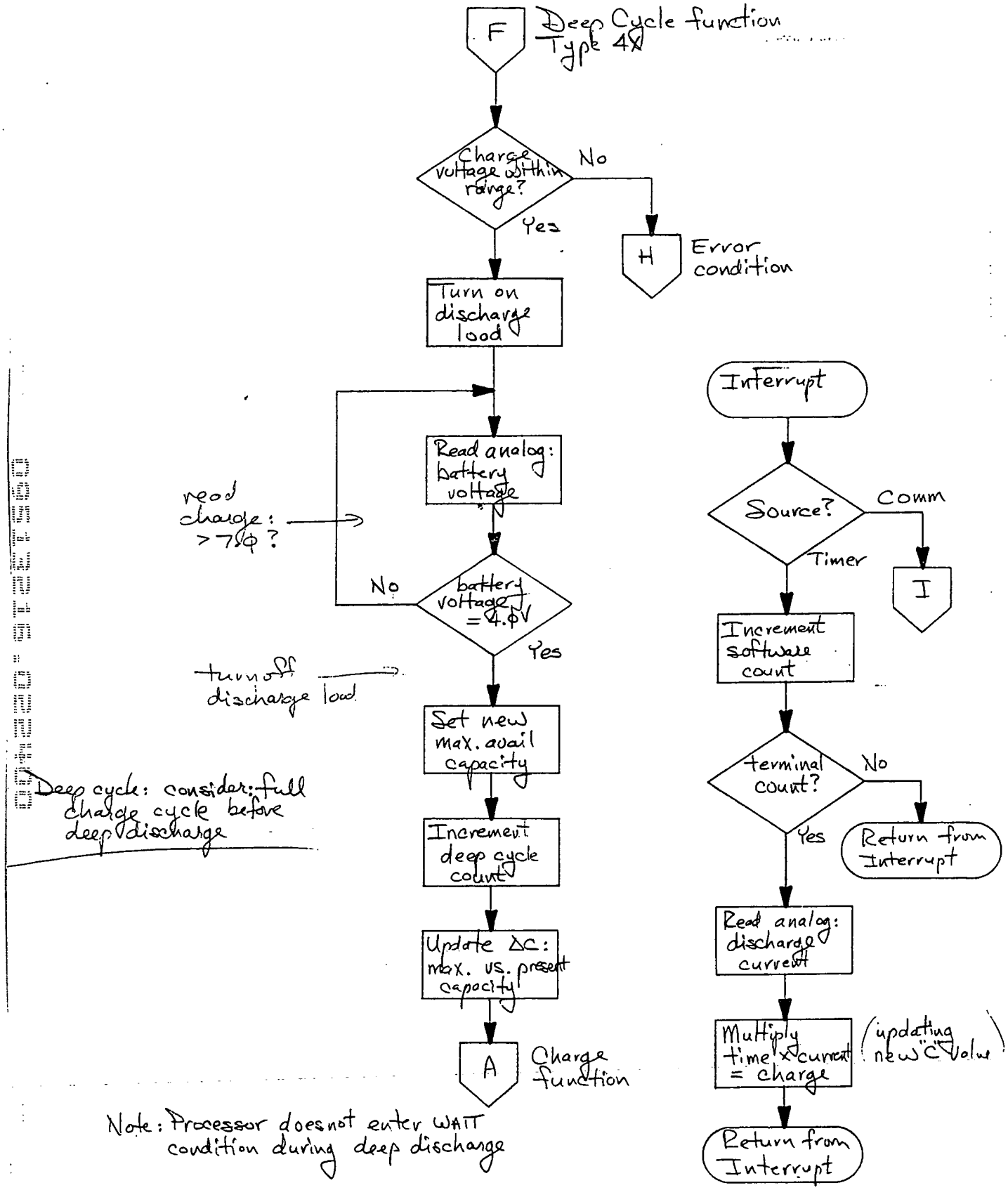


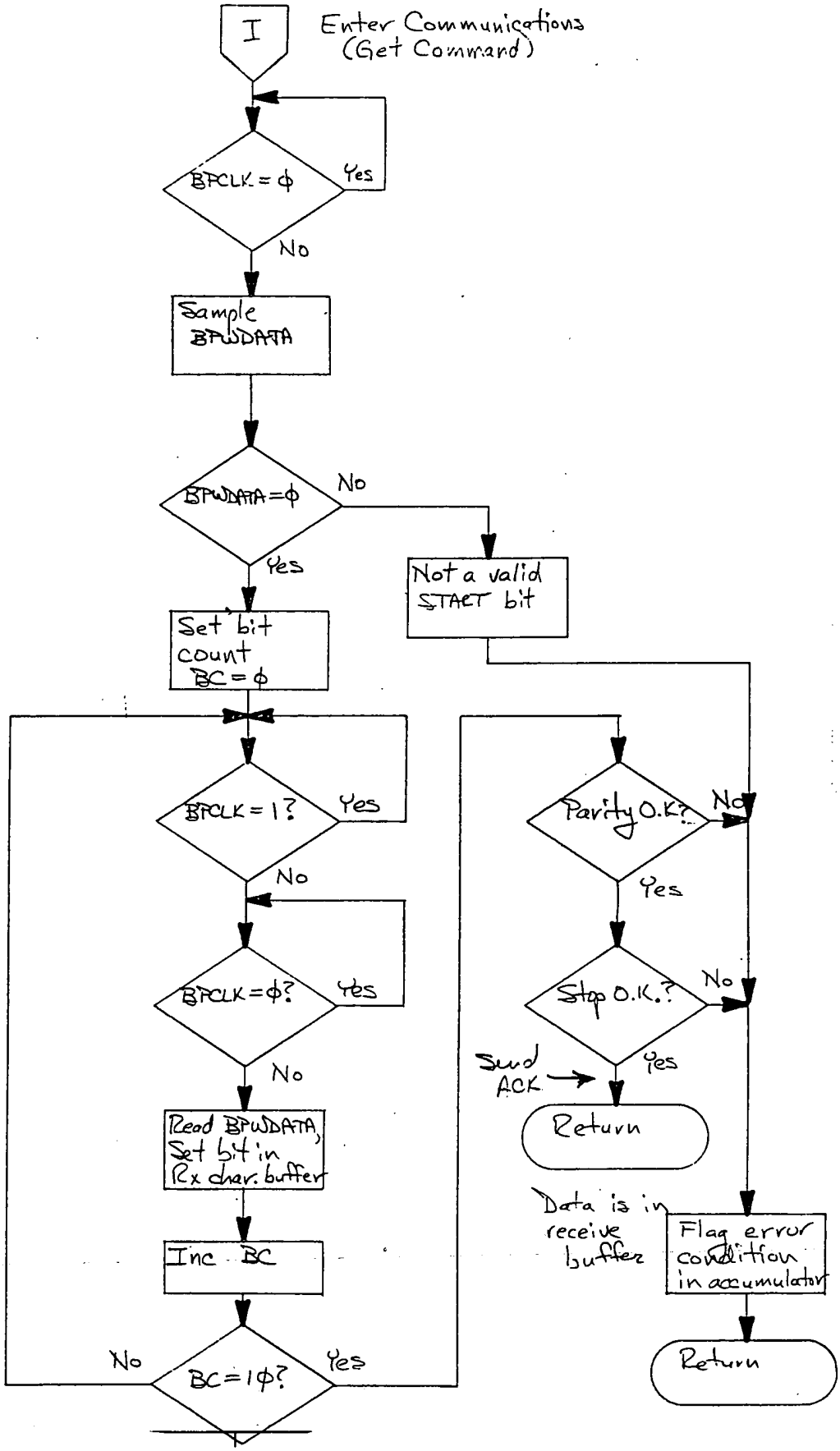
Note: Processor does not enter WAIT condition during charge.

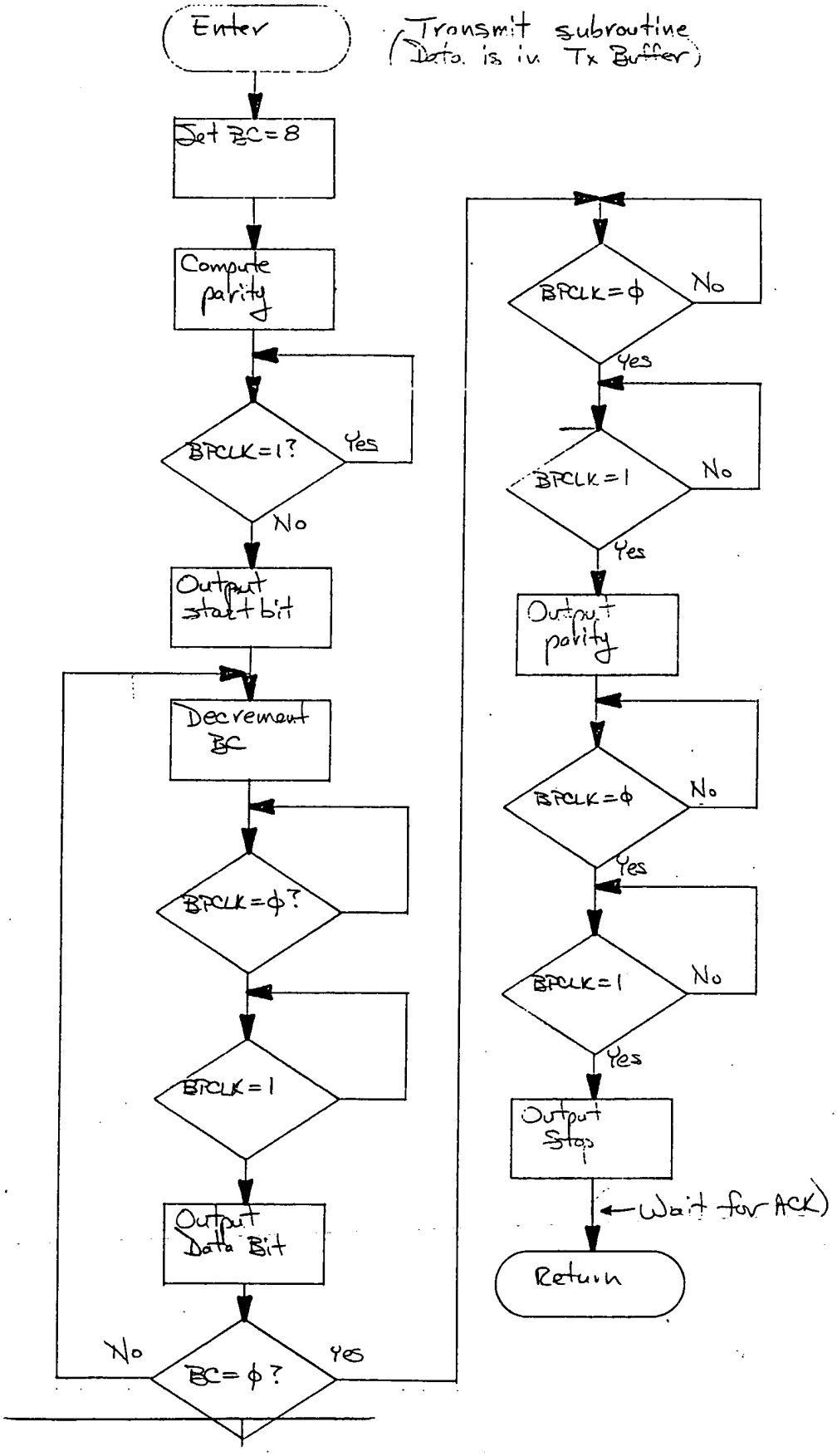

C
Read analog Type 1X
1φ
11
12
13
Read analog channel φ: charge voltage
Read analog channel 1: discharge I
Read analog channel 2: battery voltage
Read analog channel 3: temperature
Call transmit subroutine
G


D
Set Alert Points Type 2X
Call receive subroutine
2φ
21
22
Set low reserve alert point
set low voltage alert point
set minimum capacity alert point
G


E
Read history
Type 3X
30
31
32
33
34
35
Send fuel guage
Send max. avail. capacity
Send charge cycle count byte 1
Send deep cycle count byte 1
Send hours used byte 1
Send use history byte 1
Send charge cycle count byte 2
Send deep cycle count byte 2
Send hours used byte 2
Send use history byte 2
Send use history byte 3
Send use history byte 40
G


F
Deep Cycle function
Type 48
Charge voltage within range?
No
Yes
H
Error condition
Turn on discharge load
Read analog: battery voltage
read charge: >7% ?
No
battery voltage = 4.0V
Yes
turn off discharge load
Set new max. avail capacity
Increment deep cycle count
Update ΔC: max. vs. present capacity
A
Charge function
Deep cycle: consider: full charge cycle before deep discharge
Note: Processor does not enter WAIT condition during deep discharge
Interrupt
Source?
Comm
Timer
I
Increment software count
terminal count?
No
Yes
Return from Interrupt
Read analog: discharge current
Multiply time x current = charge
(updating new 'C' value)
Return from Interrupt


I
Enter Communications
(Get Command)
BPCLK = ϕ
Yes
No
Sample
BPWDATA
BPWDATA = ϕ
No
Yes
Not a valid
START bit
Set bit
count
BC = ϕ
BPCLK = 1?
Yes
No
BPCLK = ϕ?
Yes
No
Read BPWDATA,
Set bit in
Rx char. buffer
Inc BC
No
BC = 1ϕ?
Yes
Parity O.K.?
No
Yes
Stop O.K.?
No
Yes
Send
ACK
Return
Data is in
receive
buffer
Flag error
condition
in accumulator
Return


Enter
Transmit subroutine
(Data is in Tx Buffer)
Set BC=8
Compute parity
BFCLK=1?
Yes
No
Output start bit
Decrement BC
BFCLK=ϕ?
BFCLK=1
Output Data Bit
No
BC=ϕ?
yes
BFCLK=ϕ
No
Yes
BFCLK=1
No
Yes
Output parity
BFCLK=ϕ
No
Yes
BFCLK=1
No
Yes
Output Stop
(Wait for ACK)
Return